# HATCHERY EVALUATION REPORT

## Abernathy Salmon Culture Technology Center - Tule Fall Chinook

**December 1996**

# Integrated Hatchery Operations Team (IHOT)

# HATCHERY EVALUATION REPORT

## Abernathy Salmon Culture Technology Center - Tule Fall Chinook

## An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures

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Section 1

# Executive Summary

This report presents the findings of the independent audit of the Abernathy Salmon Culture Technology Center - Tule Fall Chinook program. The hatchery is located along Abernathy Creek, approximately 3 miles upstream from the creekÕs confluence with the Columbia River. The hatchery is used for adult collection, incubation, and rearing of tule fall chinook.

The audit was conducted in 1996-1997 as part of a 2-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

## Background

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) ÒStrategy for SalmonÓ and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT). IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995).* That document is the source for the performance measures that are the basis of this audit.

## The Audit Process

The audit was based on the facility managementÕs response to a 109-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters.

- The hatchery manager was asked to fill out and return the audit form.

- A 1-2 day site audit visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans.

- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.

- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.

## Abernathy Salmon Culture Technology Center - Tule Fall Chinook Results

The Abernathy facility includes 1 pond for adult holding, 12 concrete raceways, 92 circular starter tanks, 6 troughs, and incubation facilities. The facility was originally established as a National Fish Hatchery under provisions of the Mitchell Act -- a program to provide for the conservation of Columbia River fishery resources. In 1961, research activities at the Salmon Culture Laboratory in Entiat, Washington were transferred to Abernathy to expand the laboratoryÕs research program to include fall chinook.

The Abernathy Salmon Culture Technology Center - Tule Fall Chinook program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery was not meeting its adult return goal. The audit found that the hatchery was not in compliance with the water temperature criteria for spawning and rearing, alkalinity and hardness criteria, water chemistry (copper, zinc, and iron), turbidity, contaminant monitoring requirement, and pathology-free water criteria for early rearing, which are all facilities requirements. The hatchery needs to develop a smoltification monitoring program, review the release size goal, and assess if it is possible to acclimate all the fish on creek water. The hatchery was not in full compliance with all the alarm and training requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program in place.

The specific areas in which the Abernathy Salmon Culture Technology Center - Tule Fall Chinook program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Develop alarm log
- Develop approved genetics M&E program

- Develop pathogen-free water supply for early rearing
- Develop exchange training details between other hatcheries and agencies
- Develop specific incubation standards for the IHOT Operations Plan
- Follow IHOT protocols for checking flow alarms daily and other alarms weekly
- Follow IHOT protocols for equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery
- Follow IHOT temperature criteria for rearing
- Increase alkalinity and hardness or blend in well water to meet criteria
- Measure smoltification
- Review IHOT spawning temperature criteria
- Review program and/or assess ability to acclimate all fish on creek water prior to release
- Review release size goal or change program
- Run analysis for turbidity; contaminants in well water
- Treat well water to remove copper, zinc, and iron

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 3, Section 4 of this report) were not listed above.

Section 2

# Facility Description

| | |
|---|---|
| **Name:** | Abernathy Salmon Culture Technology Center |
| **Stock/Species:** | Tule Fall Chinook |
| **Operating Agency:** | U.S. Fish and Wildlife Service |
| **Funding Agency:** | Mitchell Act (NMFS) |
| **Location:** | The hatchery is located along Abernathy Creek, approximately 3 miles upstream from the creekÕs confluence with the Columbia River. |
| **Address:** | 1440 Abernathy Road<br>Longview, Washington 98632 |
| **Hatchery Manager:** | Mr. Carl Burger |
| **Phone:** | (360) 425-6072 |
| **Fax:** | (360) 636-1855 |
| **Purpose:** | The facility was originally established as a National Fish Hatchery under provisions of the Mitchell Act -- a program to provide for the conservation of Columbia River fishery resources. Abernathy began operations in 1960 and in 1961, fall chinook research activities at the Salmon Culture Laboratory in Entiat, Washington were transferred to Abernathy. |
| **Production Goal:** | **Tule Fall Chinook**<br>Produce 1.5 million subyearling tule fall chinook for on-station release |
| **Water Supply:** | Water rights total 20,600 gpm from Abernathy Creek and one well. |

Actual water use averages about 6,000 gpm from Abernathy Creek and 300 gpm from the well.

## Facilities:

| | |
|---|---|
| Adult Holding: | 1 concrete adult holding pond - 6,314 cf |
| Incubation: | 30 - 16 stack vertical incubators (480 trays) |
| Early Rearing: | 32 steel circular starter tanks |
| | 60 fiberglass circular starter tanks |
| | 6 fiberglass troughs |
| Raceways: | 12 concrete raceways - 1,500 cf each |
| Rearing Ponds: | None |
| Satellite Facilities: | None |

Section 3

# Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in ***Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*** (referred to as *IHOT 1995* in this report).

The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audit included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 109-page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Two additional sections (sections 1 and 8) include general information and expenditure information needed for this Hatchery Evaluation Report and blank forms for additional comments. The following is the basic structure of the IHOT audit form:

| | |
|---|---|
| Section 1 | Performance Measures for General Information and Expenditure Information (PMs General 1-2) |

Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

| | |
|---|---|
| Section 2 | Performance Measures for Program Objectives (PMs 1-4) |
| Section 3 | Performance Measures for Facility Requirements (PMs 5-15) |
| Section 4 | Performance Measures for Hatchery Practices (PMs 16-25) |
| Section 5 | Performance Measures for Fish Health Policy (PMs 26-34) |
| Section 6 | Performance Measures for Ecological Interactions (PMs 35-38) |
| Section 7 | Performance Measures for Genetics Policy (PMs 39-43) |
| Section 8 | Blank Forms for Additional Comments |

Several performance measures are repeated in various sections of the audit form. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by shaded text.

## The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process consisted of research and onsite visits. The site visit at the Abernathy Salmon Culture Technology Center was conducted on November 18, 1996.

The following is the five-step audit process:

1. Information was obtained from headquarters.

2. The hatchery manager was asked to fill out and return the **Audit Form**.

3. A 1-2 day site audit visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.

4. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative. A portion of the Hatchery Evaluation Report was sent to the hatchery manager following the audit visit as a **Compliance Report**. That Compliance Report is Table 2 of this report.

5. Information from steps 1-4 was used to prepare a draft **Hatchery Evaluation Report**. This draft report was submitted to the operating agencies for review of the information used to determine compliance. Based on review and comments, a final Hatchery Evaluation Report was developed. The final report documents the compliance of a particular hatchery with the IHOT performance measures and presents cost estimates to correct any deficiencies.

## Compliance Status of Abernathy Salmon Culture Technology Center - Tule Fall Chinook

The following table includes information on life-stages that are held on this facility for some portion of their rearing cycle (Table 1). For multi-facility programs, summary cost and contribution data is presented at the facility where rearing occurs. For the compliance status relating to performance measures that do not occur at this hatchery, please refer to the Hatchery Evaluation Reports for the hatcheries and stocks listed in Table 1. A check mark (4) indicates that the specific life-stage is held at this facility.

This section documents the compliance status of the Abernathy Salmon Culture Technology Center - Tule Fall Chinook program. Each performance measure is presented in a table taken from the audit form (Table 2). The compliance status is identified by the following categories:

- **N/A** (not applicable)
- **Yes** (in compliance)
- **?** (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4 of this report, where the cost of the required remedial actions is also presented.

**Table 1 Summary Program Information for Abernathy Salmon Culture Technology Center - Tule Fall Chinook**

| Component | Location of Adult Holding, Spawning, Incubation, and Rearing | | | | | |
|---|---|---|---|---|---|---|
| | Abernathy Salmon Culture Technology Center | | | | | |
| Adult Collection | 4 | | | | | |
| Adult Holding | 4 | | | | | |
| Spawning | 4 | | | | | |
| Fertilization | 4 | | | | | |
| Incubation | | | | | | |
| green-to-eyed | 4 | | | | | |
| eyed-to-hatch | 4 | | | | | |
| Rearing | | | | | | |
| fry | 4 | | | | | |
| fingerlings | 4 | | | | | |
| smolts | 4 | | | | | |
| Acclimation/release | 4 | | | | | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #1 | **Are the hatchery programs outlined in a subbasin management plan?** | | 4 | | | Columbia Basin System Planning Production Plan and Columbia River Fish Management Plan | |
| #2 | **Is the hatchery operating under a current hatchery operational plan?** | | 4 | | | IHOT Operations Plan | |
| | Is it understood by staff? | | 4 | | | | |
| | Is it being followed? | | | | 4 | IHOT Operations Plan is not used for day-to-day operations | None: this is a research facility |
| #3 | **Is a hatchery monitoring and evaluation plan in place?** | | | | | | |
| | Do you have a written monitoring and evaluation plan? | | 4 | | | CWT for Missing Production Group Program | |
| #4a | **Adult contribution to fisheries, spawning grounds, and hatchery** | | 4 | | | Tagging started with 1989 broodstock | |
| #4b | **Adult pre-spawning survival as compared with established goal** | | 4 | | | Review of records; in compliance 5 out of last 5 years | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| #4c | **Egg-take as compared with established hatchery goal** | | | | 4 | Review of records; in compliance 5 out of last 8 years | Improve adult returns |
| #4d | **Green-egg to eyed-egg survival as compared with established goal** | | 4 | | | Review of records; in compliance 5 out of last 5 years | |
| #4e | **Eyed-egg to fry survival as compared with established goal** | | 4 | | | Review of records; in compliance 5 out of last 5 years | |
| #4f | **Fry to smolt survival as compared with established goal** | | 4 | | | Review of records; in compliance 5 out of last 5 years | |
| #4g | **Production as compared with established goal** | | | | 4 | Review of records; in compliance 2 out of last 5 years | Improve adult returns |
| #4h | **Percent survival (smolt to adult) as compared with established goal** | | | | 4 | Review of records; in compliance 0 out of last 1 years (only 1 yearÕs data is available at this time) | Improve adult returns |
| #4i | **Number of eggs, fry, fingerlings, smolts, and/or adults to meet basinwide needs** | 4 | | | | Review of records/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #5a | **Temperature** | | | | | | |
| | Does your water temperature meet the criteria for spawning? | | | | 4 | No excessive pre-spawning mortality | Review IHOT spawning temperature criteria |
| | Does your water temperature meet the criteria for incubation? | | 4 | | | Review of records/Discussion | |
| | Does your water temperature meet the criteria for rearing? | | | | 4 | Well water ok; creek water can be colder or warmer than criteria. Is not thought to be a problem | Follow IHOT temperature criteria for rearing |
| #5b | **Dissolved gases** | | | | | | |
| | Is the oxygen level near saturation? | | 4 | | | Review of records/Discussion | |
| | Is the dissolved nitrogen level less than saturation? | | 4 | | | Review of records/Discussion | |
| #5c | **Chemistry** | | | | | | |
| | Ammonia (un-ionized) | | 4 | | | Review of records/Discussion | |
| | Carbon Dioxide | | 4 | | | Review of records/Discussion | |
| | Chlorine | | 4 | | | Review of records/Discussion | |
| | pH | | 4 | | | Review of records/Discussion | |
| | Copper | | | | 4 | Review of records/Discussion | Treat well water to remove copper |
| | Hydrogen Sulfide | | 4 | | | Review of records/Discussion | |
| | Iron | | | | 4 | Review of records/Discussion | Treat well water to remove iron |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | Zinc | | | | 4 | Review of records/Discussion | Treat well water to remove zinc |
| #5d | **Turbidity** | | | | | | |
| | Does your turbidity meet the criteria? | | | 4 | | No data | Monitor turbidity. |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #5e | **Alkalinity and hardness** | | | | | | |
| | Does your alkalinity and hardness meet the criteria? | | | | | | |
| | Creek water | | | | | | |
| | Well water | | 4 | | 4 | Both alkalinity and hardness are less than the criteria | Increase alkalinity and hardness or blend in well water to meet criteria |
| #5f | **Nitrite** | | | | | | |
| | Does your nitrite meet the criteria? | | 4 | | | Review of records/Discussion | |
| #5g | **Contaminants** | | | | | | |
| | Aldrin | | | 4 | | Well ok; no data on creek | Run analysis on creek water |
| | Endrin | | | 4 | | See above | See above |
| | Dieldrin | | | 4 | | See above | See above |
| | Heptachlor | | | 4 | | See above | See above |
| | Chlordane | | | 4 | | See above | See above |
| | Methoxychlor | | | 4 | | See above | See above |
| | Lindane | | | 4 | | See above | See above |
| | Malathion | | | 4 | | See above | See above |
| | Guthion | | | 4 | | See above | See above |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| #5h | **Pathogens** | | | | | | |
| | What portions of the hatchery have disease-free water? | | | | | | |
| | Adult holding | | | | 4 | Creek water | |
| | Incubation | | 4 | | | Well water | |
| | Early rearing | | | | 4 | Creek water | |
| | Early rearing (reuse system) | | | | 4 | Well water + reuse water | |
| | Rearing | | | | 4 | Creek water | |
| | Rearing (reuse system) | | | | 4 | Well water + reuse water | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #6 | **Alarm Systems** | | | | | | |
| | Do the following areas have alarms? | | | | | | |
| | Intake | | 4 | | | Inspection of facilities/Discussion | |
| | Large rearing ponds and adult holding ponds | | 4 | | | Inspection of facilities/Discussion | |
| | Raceway headboxes and rearing ponds | | 4 | | | Inspection of facilities/Discussion | |
| | Incubation facilities | | 4 | | | Inspection of facilities/Discussion | |
| | Quarantine areas and facilities | 4 | | | | None | |
| | Water treatment systems | | 4 | | | Inspection of facilities/Discussion | |
| | Security | | 4 | | | Inspection of facilities/Discussion | |
| | Are there outside systems and buzzers in onsite residences? | | 4 | | | Discussion | |
| | Are water flow alarms checked daily? | | | | 4 | Checked every two weeks | Follow IHOT protocols for checking flow alarms daily and other alarm weekly |
| | Are all other alarms checked weekly? | | | | 4 | Checked every two weeks | See above |
| | Is there a log of alarms for emergencies, tests, and maintenance requirements? | | | | 4 | Review of records/Discussion | Develop alarm log |
| | Are telephone pagers used? | | 4 | | | Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| #7 | **Adult collection and holding facilities** | | | | | | |
| | Do you meet the adult holding criteria? | | 4 | | | Need a new adult holding facility; walls are coming apart | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #8 | **Incubation facilities** | | | | | | |
| | Type 1: Heath trays<br>Do you have an adequate number of units for the overall program? | | 4 | | | Units are old and need to be replaced | |
| | Type 2: _____<br>Do you have an adequate number of units for the overall program? | 4 | | | | | |
| #9 | **Rearing facilities** | | | | | | |
| | Type 1: Raceways<br>Do you have an adequate number of units for the overall program? | | 4 | | | Inspection of facilities/Discussion | |
| | Type 2: Raceways - reuse system<br>Do you have an adequate number of units for the overall program? | | 4 | | | Inspection of facilities/Discussion | |
| | Type 3: _____<br>Do you have an adequate number of units for the overall program? | 4 | | | | | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| #10 | **Screening facilities** | | | | | | |
| | Do you meet the approach velocity criteria? | | 4 | | | Inspection of facilities/Discussion | |
| | Are the fish screens regularly cleaned? | | 4 | | | Inspection of facilities/Discussion | |
| | Does the screen mesh meet screen opening criteria? | | 4 | | | Inspection of facilities/Discussion | |
| | Are rearing containers double screened for fish that should not be released to adjacent water? | 4 | | | | Fish released on station | |
| #11 | **Predator control facilities** | | | | | | |
| | Are your predation control facilities effective? | | 4 | | | Inspection of facilities/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #12 | **Food storage facilities and quality control** | | | | | | |
| | Does the storage of dry/semi-moist/moist foods (dry<12%; semi-moist 12-20%; moist >20% moisture) follow food manufacturerÕs recommendations? | | 4 | | | Discussion | |
| | Does a regional quality control officer oversee production procedures and monitor: | | | | | | |
| | Verification by feed manufacturer that ingredients meet specifications? | | 4 | | | Discussion | |
| | Ensure feed does not contain unwanted drugs or other additives? | | 4 | | | Discussion | |
| | Analyze ingredients contained in the final food product to ensure that feed specifications have been met? | | 4 | | | Discussion | |
| | Are the foods stored and handled according to the following criteria? | | | | | | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | Moist pellets should not exceed 10 °F at point of delivery. | | 4 | | | Discussion | |
| | Moist pellets should be removed from freezer just prior to feeding. | | 4 | | | Discussion | |
| | Do not leave buckets of feed or feed containers outside exposed to light or heat. | | 4 | | | Discussion | |
| | Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish. | | 4 | | | Discussion | |
| | Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above). | | 4 | | | Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #13 | **Release facilities** | | | | | | |
| | Do the release facilities ensure that fish are not subjected to adverse conditions? | | 4 | | | Inspection of facilities/Discussion | |
| #14 | **Pollution abatement facilities** | | | | | | |
| | Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)? | | 4 | | | Inspection of facilities/Discussion | |
| | Are pollution abatement facilities operated correctly? | | 4 | | | Discussion | |
| #15 | **Transportation facilities** | | | | | | |
| | Are the transport systems adequate to meet IHOT performance measures for transportation practices? | 4 | | | | No transportation | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #16 | **Broodstock selection practices** | | | | | | |
| | Is the donor selection process document attached? (PM #40a) | 4 | | | | Existing program; does not apply | |
| | Was the donor selection outline followed in selecting the hatchery broodstock? (PM #40b-c) | 4 | | | | Existing program; does not apply | |
| #17 | **Spawning practices** | | | | | | |
| | Were the appropriate number of spawners, male/female ratios, and fertilization protocols used? (PM #42c-g) | | 4 | | | Review of records/Discussion | |
| #18 | **Incubation practices** | | | | | | |
| | Are specific incubation standards listed in the hatchery operations plan? | | 4 | | | Reviewed Hatchery Operations Plan | Develop specific incubation standards for the IHOT Operations Plan |
| | Are incubation practices written? | | 4 | | | | |
| | Incubation Type 1: Heath Tray (see PM #8) Do you meet the loading and flow criteria? | | | | 4 | Use less eggs and lower flow; no problems observed | None |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | Incubation Type 2: _____ (see PM #8)<br><br>Do you meet the loading and flow criteria? | 4 | | | | | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #19 | **Rearing practices** | | | | | | |
| | Are specific rearing standards listed in the hatchery operations plan? | | | | 4 | This is facility is conducting research on density and therefore does not have written standards | None |
| | Are rearing practices written? | | | | 4 | See above | None |
| | Rearing Unit Type 1: Creek Raceways (see PM #9) | | | | | | |
| | Do you meet the density and DI criteria? | | | 4 | | See above | None |
| | Do you meet the Loading and FI criteria? | | | 4 | | See above | None |
| | Rearing Unit Type 2; Reuse Raceways (see PM #9) | | | | | | |
| | Do you meet the density and DI criteria? | | | 4 | | See above | None |
| | Do you meet the Loading and FI criteria? | | | 4 | | See above | None |
| | Rearing Unit Type 3: _____ (see PM #9) | | | | | | |
| | Do you meet the density and DI criteria? | 4 | | | | | |
| | Do you meet the Loading and FI criteria? | 4 | | | | | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| #20 | **Smolt quality** | | | | | | |
| | Do you produce a high quality smolt? | | 4 | | | Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #21 | **Fish health management practices** | | | | | | |
| | Are the monthly hatchery monitoring visits being conducted? (PM #26) | | 4 | | | Review of records/Discussion | |
| | Are the annual broodstock inspections being conducted? (PM #27) | | 4 | | | Review of records/Discussion | |
| | Is there pathogen-free water (PM #5h)and are the sanitation procedures being followed? (PM #28) | | 4 | | | Review of records/Discussion | |
| | Are the following water quality parameters within criteria? (PM #5a-5g) | | | | | | |
| | Water temperature | | | | 4 | Review of records/Discussion | See PM #5a |
| | Dissolved gases | | 4 | | | Review of records/Discussion | |
| | Chemistry | | | | 4 | Review of records/Discussion | See PM #5c |
| | Turbidity | | 4 | | | Review of records/Discussion | |
| | Alkalinity and hardness | | | | 4 | Review of records/Discussion | See PM #5e |
| | Nitrite | | 4 | | | Review of records/Discussion | |
| | Contaminants | | | 4 | | Review of records/Discussion | See PM #5g |
| | Are rearing standards being followed? (PM #19) | | | | 4 | Review of records/Discussion | See PM #19 |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | Are egg and fish transfer/release requirements met?<br>(PM #31) | | 4 | | | Review of records/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #22a | **Does hatchery performance meet requirements outlined in the regional hatchery policies and in subbasin and hatchery plans for the following areas?** | | | | | | |
| #22a1 | **Percent smoltification** | | | | | | |
| | Do you measure percent smoltification? | | | | 4 | Discussion | Measure smoltification |
| | Did you meet the smoltification criteria? | | | 4 | | Discussion | See above |
| #22a2 | **Rearing density (prior to release)** | | | | | | |
| | Did you meet the rearing density criteria just prior to release? | | | 4 | | No standard density criteria because of research work | None |
| #22a3 | **Disease condition (at release)** | | | | | | |
| | Did you meet all disease regulations just prior to release? | | 4 | | | Review of records/Discussion | |
| #22a4 | **Number (at release)** | | | | | | |
| | Did you meet the release number goal? | | | | 4 | In compliance 1 out 2 last years | Improve adult returns |
| #22a5 | **Size at release** | | | | | | |
| | Did you meet the size goal? | | | | 4 | Review of records/Discussion | Review release size goal |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| #22a6 | **Dates of release** | | | | | | |
| | Did you meet the release date goal? | | 4 | | | Review of records/Discussion | |
| #22a7 | **Location of release** | | | | | | |
| | Did you release the fish at the specified location? | | 4 | | | Review of records/Discussion | |
| #22b | **Are fish reared in the subbasin or acclimated in the subbasin?** | | | | | | |
| | Are the fish reared in the subbasin? | | 4 | | | Discussion | |
| | Are the fish acclimated in the subbasin? | | | | 4 | 50% of fish acclimated on well water prior to release | Review program and/or assess ability to acclimate all fish on creek water prior to release |
| #22c | **Is the release strategy appropriate for the program?** | | | | 4 | Discussion. See PM #22b | See PM #22b |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #23 | **Transportation facilities** | | | | | | |
| | Do transportation equipment and personnel receive disinfection before and after use? | 4 | | | | No transportation | |
| | Is the fish tank interior disinfected using a solution of 200 ppm active chlorine for 30 minutes minimum or formaldehyde gas generation method (relative humidity of 60% for 2 hrs)? | 4 | | | | See above | |
| | Is the exterior of the fish transport vehicle disinfected using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes? | 4 | | | | See above | |
| | Is the fish transport vehicle (cab) disinfected using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)? | 4 | | | | See above | |
| | Is other equipment disinfected including fish pumps, nets, egg sorters, waders, boots, rain gear, hoses and other equipment using one of the following solutions? | 4 | | | | See above | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | 200 ppm chlorine for 30 minutes<br>600 ppm quaternary ammonia compound for 30 minutes<br>200 ppm iodophor solution for 10 minutes | 4 | | | | See above | |
| | Do personnel wear protective garments when handling fish eggs or cultural water? | 4 | | | | See above | |
| | Do the fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season? | 4 | | | | See above | |
| | Is a daily service inspection completed before starting up and leaving for the day? | 4 | | | | See above | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #23 (cont) | **Transportation facilities** | | | | | | |
| | Does the fish transport unit receive an inspection prior to loading? | 4 | | | | See above | |
| | Does a pre-loading inspection covering tank water level, pumps or aerators, oxygen injection system settings, displacement gauge, and truck loading/hauling density tables checked and reviewed occur prior to loading fish in the transport unit? | 4 | | | | See above | |
| | Do hauling criteria include checking the fish 45 minutes to 1 hour after loading? | 4 | | | | See above | |
| | When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained at approximately 8 ppm? | 4 | | | | See above | |
| | Is water temperature in the transportation unit maintained within the 42-48 °F range? | 4 | | | | See above | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | Do fish releasing procedures include the following criteria? | | | | | | |
| | Releasing the fish at the correct release site or into the correct water body. | 4 | | | | See above | |
| | Tempering or the difference between the liberation tank and the target water body should not exceed 10°F. | 4 | | | | See above | |
| | The liberation hose should be angled so that fish gently hit the water. Using a tripod is a method of ensuring the hose will stay at the proper angle. | 4 | | | | See above | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #24 | **Evaluation practices** | | | | | | |
| | Has the hatchery conducted fishery contribution studies to: | | | | | | |
| | Determine the requirements for evaluating and improving management programs? | | 4 | | | Contribute to Missing Production Group Reports | |
| | Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit? | | 4 | | | Discussion | |
| | Develop guidelines that define if the proper stocks of fish are currently being used? | | 4 | | | Discussion | |
| | Determine which management units contribute to a specific fishery and the time periods of those contributions? | | 4 | | | Discussion | |
| | Determine the relative contributions of the various management units to a specific fishery over the different time periods? | | 4 | | | Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #25 | **Training practices** | | | | | | |
| | Does the hatchery have a training schedule for its staff? | | 4 | | | Review of records/Discussion | |
| | Does each staff member have a personal training plan approved by a supervisor and reviewed annually? | | 4 | | | Review of records/Discussion | |
| | Does the hatchery routinely exchange training details between other hatcheries and agencies? | | | | 4 | Review of records/Discussion | Develop exchange training details between other hatcheries and agencies |
| | Does the hatchery encourage and reward off-duty training of staff? | | 4 | | | Review of records/Discussion | |
| | Does the hatchery conduct monthly staff meetings? | | 4 | | | Review of records/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #26 | **Are monthly hatchery monitoring visits being conducted by a qualified fish health specialist as described below?** | | | | | | |
| | Conduct visit at least monthly | | 4 | | | Review of records/Discussion | |
| | Monitoring conducted by qualified fish health specialist | | 4 | | | Review of records/Discussion | |
| | Examine a representative sample of healthy and moribund fish from each lot. | | 4 | | | Review of records/Discussion | |
| | Review fish culture practices with hatchery manager. | | 4 | | | Review of records/Discussion | |
| | Report finding and results of necropsies on standard form. | | 4 | | | Review of records/Discussion | |
| | Recommend appropriate drug or chemical treatment. | | 4 | | | Review of records/Discussion | |
| | Summarize fish health status or stock prior to release or transfer to another facility. | | 4 | | | Review of records/Discussion | |
| #27 | **Are all of the functions of the hatchery yearly monitoring visits being completed as described below?** | | | | | | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | Annually examine each broodstock for the presence of reportable viral pathogens. | | 4 | | | Review of records/Discussion | |
| | Annually screen each salmon broodstock for the presence of *Renibacterium salmoninarum*. | | 4 | | | Review of records/Discussion | |
| | Conduct inspection by or under the supervision of qualified fish health specialist. | | 4 | | | Review of records/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #28 | **Is the hatchery following accepted sanitation procedures?** | | | | | | |
| | Are there any sources of pathogen-free water, especially for incubation and early rearing? | | 4 | | | Develop pathogen-free water supply for early rearing. Incubation ok. | |
| | Are the hatchery sanitation procedures understood and being followed as described below? | | | | | | |
| | Disinfect/water harden eggs in iodophor? | | 4 | | | Inspection of facilities/Discussion | |
| | Are foot baths containing disinfectant placed at the incubation facilityÕs entrance and exit? | | 4 | | | Inspection of facilities/Discussion | |
| | Is equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery? | | | | 4 | Inspection of facilities/Discussion | Follow IHOT protocols for equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery |
| | Is equipment used to collect dead fish sanitized prior its use in another pond and/or lot of fish? | | 4 | | | Inspection of facilities/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location? | 4 | | | | No transfers | |
| | Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock? | | 4 | | | Inspection of facilities/Discussion | |
| | Are dead fish properly disposed of? | | 4 | | | Inspection of facilities/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #29 | **Are water quality parameters being followed?** | | | | | | |
| | Are the following water quality parameters within criteria? (PM #5a-5g) | | | | | | |
| | Water temperature | | | | 4 | Review of records/Discussion | See PM #5a |
| | Dissolved gases | | 4 | | | Review of records/Discussion | |
| | Chemistry | | | | 4 | Review of records/Discussion | See PM #5c |
| | Turbidity | | 4 | | | Review of records/Discussion | |
| | Alkalinity and hardness | | | | 4 | Review of records/Discussion | See PM #5e |
| | Nitrite | | 4 | | | Review of records/Discussion | |
| | Contaminants | | | 4 | | Review of records/Discussion | See PM #5g |
| | Go to PM #21 | | | | | | |
| #30 | **Are incubation and rearing standards being followed?** | | | | | | |
| | Are the incubation practices following the IHOT incubation criteria? (PM #18) | | | 4 | | Review of records/Discussion | See PM #18 |
| | Are the rearing practices following the IHOT criteria? (PM #19) | | | 4 | | Review of records/Discussion | See PM #19 |
| | Go to rearing practices PM #18-PM #19 | | | | | | |
| #31 | **Are egg and fish transfer/release requirements met?** | | 4 | | | Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #32 | **Is the hatchery's program outlined in a subbasin management plan?** Go to subbasin plan PM #1 | | 4 | | | Columbia Basin System Planning Production Plan and Columbia Fish Management Plan | |
| #33 | **Is the hatchery operating under a current hatchery operational plan?** Go to operational plan PM #2 | | | | 4 | IHOT Operations Plan is not used for day-to-day operations | See PM #2 |
| #34 | **Is a hatchery monitoring and evaluation plan in place?** Go to hatchery monitoring and evaluation plan PM #3 | | 4 | | | CWT for Missing Production Group Program | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #35 | **Does the hatchery program meet requirements established in the regional hatchery policies and subbasin planning documents in the following areas: species, stock, broodstock collection location, broodstock numbers, broodstock collection strategy, and spawning and egg-take protocols?** | | | | | | |
| | Does the hatchery program meet the requirements for the following? | | | | | | |
| | Species protocols (PM #4a) | | 4 | | | Review of records/Discussion | |
| | Stock protocols (PM #4a) | | 4 | | | Review of records/Discussion | |
| | Broodstock collection location protocols (PM #41b for existing program; PM #39b for new program ) | | 4 | | | Review of records/Discussion | |
| | Broodstock numbers protocols (PM #42c) | | 4 | | | Review of records/Discussion | |
| | Broodstock collection strategy protocols (PM #41b-d for existing program; PM 39b-f for new program) | | 4 | | | Review of records/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| | Spawning protocols (PM #42d-e) | | 4 | | | Review of records/Discussion | |
| | Egg-take protocols (PM #42f-g) | | 4 | | | Review of records/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #36 | **Does the hatchery's performance meet requirements outlined in the regional hatchery policies and in subbasin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location of release?** | | | | | | |
| | Percent smoltification (PM #22a1) | | | | 4 | Review of records/Discussion | See PM #22a1 |
| | Rearing density (PM #22a2) | | | 4 | | Review of records/Discussion | See PM #22a2 |
| | Disease condition (PM #22a3) | | 4 | | | Review of records/Discussion | |
| | Number at release (PM #22a4) | | | | 4 | Review of records/Discussion | See PM #22a4 |
| | Size at release (PM #22a5) | | | | 4 | Review of records/Discussion | See PM #22a5 |
| | Date of release (PM #22a6) | | 4 | | | Review of records/Discussion | |
| | Location of release (PM #22a7) | | 4 | | | Review of records/Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| #37 | **Are fish reared in the subbasin or acclimated in the subbasin?**<br><br>See PM #22b | | | | 4 | 50% are acclimated on well water prior to release | See PM #22b |
| #38 | **Is the release strategy appropriate for the program?**<br><br>See PM #22c | | | | 4 | Discussion | See PM #22b |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #39 | **For new programs, has a broodstock collection plan been developed?** | | | | | | |
| #39a | Is the broodstock collection plan written? | 4 | | | | Existing Program; does not apply | |
| | For a non-captive broodstock program: | 4 | | | | Existing Program; does not apply | |
| #39b | Was an unbiased, representative sample collected? | | | | | | |
| #39c | Was the recommended number of broodstock collected? | 4 | | | | Existing Program; does not apply | |
| | For a captive broodstock program: | | | | | | |
| #39d | Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program? | 4 | | | | Existing Program; does not apply | |
| #39e | Were full-sib crosses avoided? | 4 | | | | Existing Program; does not apply | |
| #39f | Is the broodstock collection plan understood and being followed by staff? | 4 | | | | Existing Program; does not apply | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| | | N/A | Yes | ? | No | | |
|---|---|---|---|---|---|---|---|
| #40 | **For a new program, was the donor selection outline followed in selecting the hatchery broodstock?** | | | | | | |
| #40a | Is a donor selection plan written? | 4 | | | | Existing Program; does not apply | |
| #40b | Was the donor selection outline followed in selecting the broodstock? | 4 | | | | Existing Program; does not apply | |
| #40c | Was the target stock recommended in the donor selection process actually used? | 4 | | | | Existing Program; does not apply | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #41 | **For existing programs, were the broodstock collection procedures followed?** | | | | | | |
| #41a | Is the broodstock collection plan written? | | 4 | | | Review broodstock collection plan in IHOT Operations Plan | |
| | Does the broodstock collection plan follow the guideline: | | | | | | |
| #41b | Was an unbiased, representative sample collected? | | 4 | | | Discussion | |
| #41c | Was the recommended number of broodstock collected? | | 4 | | | Discussion | |
| #41d | Were the broodstock collection procedures in hatchery operation plan understood and followed? | | 4 | | | Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #42 | **Was the appropriate number of spawners, male/female ratios, and fertilization protocols used?** | | | | | | |
| #42a | Are the spawning protocols written? | | 4 | | | Review of plan | |
| #42b | Are daily or weekly spawning logs available? | | 4 | | | Review of records | |
| #42c | Was the appropriate number of spawners used? | | 4 | | | Discussion | |
| #42d | Did you attempt to spawn all collected broodstock and randomize mating with respect to age class, and other traits? | | 4 | | | Discussion | |
| #42e | Was the sex-ratio within the limits given in the performance standards? | | 4 | | | Discussion | |
| #42f | Were the fertilization protocols followed? | | 4 | | | Discussion | |
| #42g | If the hatchery needed to reduce the number of eggs retained, was this done by representative sampling of each male/female cross? | | 4 | | | Discussion | |

**Table 2 Abernathy Salmon Culture Technology Center - Tule Fall Chinook Compliance With Performance Measures**

| PM # | Description of Performance Measure | Compliance Status | | | | Basis for Compliance or Non-Compliance | Remedial Action Needed for Compliance |
|---|---|---|---|---|---|---|---|
| | | N/A | Yes | ? | No | | |
| #43 | **Is there a genetics monitoring and evaluation program in place?** | | | | | | |
| | Is a genetics monitoring and evaluation program available? | | | | 4 | Discussion | Develop approved genetics M&E plan |
| | Does the plan address the following elements listed in IHOT: | | | | | | |
| | Does the program have elements needed to meet evaluation goals 1-4? | | | | 4 | Discussion | See above |
| | Has a qualified geneticist reviewed and endorsed the program (goal 5)? | | | | 4 | Discussion | See above |
| | Will the program collect the data and maintain the records needed to evaluate compliance on an ongoing basis (goal 5)? | | | | 4 | Discussion | See above |
| | Is the program understood and followed by staff? | | | | 4 | Discussion | See above |

Section 4

# Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The types of categories range across a spectrum from those actions that are beyond human control, to those that require a change in agency policy or procedures, to those that involve a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

**The Five Types of Remedial Actions**

| Type | Description |
|---|---|
| 1 | Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery |
| 2 | Remedial actions requiring changes in agency policies or procedures |
| 3 | Remedial actions requiring changes in monitoring coverage or interval |
| 4 | Remedial actions requiring significant capital expenditures |
| 5 | Remedial actions that may require significant capital expenditures but are not clearly definable at this time |

# Remedial Actions at Abernathy Salmon Culture Technology Center - Tule Fall Chinook

This section presents the corrective actions required to bring the Abernathy Salmon Culture Technology Center - Tule Fall Chinook program into compliance with IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 3).

The cost estimates presented in this section are based on professional experience from similar projects. In most cases, only a lump-sum figure is presented, and detailed take-off lists have not been prepared. The cost estimates are essentially order of magnitude estimates (± 40%).

More importantly, the suggested remedial activities may also present several levels of action. Optional actions have been listed for several problems. These optional actions are desirable for either operational or safety considerations.

## Table 3. Remedial Actions Required at Abernathy Salmon Culture Technology Center - Tule Fall Chinook

| Remedial Action Required | Cost | PMs[1] |
|---|---|---|
| **Type 1** - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery | | |
| Improve adult returns | ---- | 4c, 4g, 4h, 22a4 |
| **Type 2** - Remedial actions requiring changes in agency policies or procedures | | |
| Review IHOT spawning temperature criteria | ---- | 5a |
| Follow IHOT temperature criteria for rearing | ---- | 5a |
| Follow IHOT protocols for checking flow alarms daily and other alarms weekly | ---- | 6 |
| Develop alarm log | ---- | 6 |
| Develop specific incubation standards for the IHOT Operations Plan | ---- | 18 |
| Measure smoltification | ---- | 22a1 |
| Review release size goal or change program | ---- | 22a5 |
| Develop exchange training details between other hatcheries and agencies | ---- | 25 |
| Follow IHOT protocols for equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery | ---- | 28 |
| Develop approved genetics M&E program | ---- | |

| Remedial Action Required | Cost | PMs[2] |
|---|---|---|
| **Type 3** - Remedial actions requiring changes in monitoring coverage or interval | | |
| Run analysis for turbidity; contaminants in well water | ---- | 5d, 5g |
| **Type 4** - Remedial actions requiring significant capital expenditures | | |
| Increase alkalinity and hardness or blend in well water to meet criteria | $3,000 | 5e |
| **Type 5** - Remedial actions that may require significant capital expenditures but are not clearly definable at this time | | |
| Treat well water to remove copper, zinc, and iron | ---- | 5c |
| Review program and/or assess ability to acclimate all fish on creek water prior to release | ---- | 22b, 22c |
| Develop pathogen-free water supply for early rearing | ---- | 28 |

Section 5

# Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Abernathy Salmon Culture Technology Center - Tule Fall Chinook program contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2-, 3-, 4-, 5-, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4 to 5 years after the fish have been released from the hatchery.

**Table 4. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Abernathy Salmon Culture Technology Center - Tule Fall Chinook**

| Year | Fisheries (Broodyear) | Spawning Grounds[1] (Broodyear) | Hatchery[1] (Broodyear) | Total Combined Contribution (Broodyear) | Smolt to Adult Survival (percent) |
|---|---|---|---|---|---|
| 1981 | | | | | |
| 1982 | | | | | |

Data obtained from Missing Production Groups Annual Report or from the Regional Mark Information System database.

Total combined adult contribution; presented when it is not possible to subdivide the contribution into fisheries, spawning grounds, and hatchery contributions.

| | | | | | |
|---|---|---|---|---|---|
| 1983 | | | | | |
| 1984 | | | | | |
| 1985 | | | | | |
| 1986 | | | | | |
| 1987 | | | | | |
| 1988 | | | | | |
| 1989 | 2768 | 81 | 447 | | 0.18 |
| 1990 | Not complete | Not complete | Not complete | Not complete | Not complete |
| 1991 | Not complete | Not complete | Not complete | Not complete | Not complete |
| 1992 | Not complete | Not complete | Not complete | Not complete | Not complete |

# Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program was estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 5 shows the annual operating expenses for the Abernathy Salmon Culture Technology Center - Tule Fall Chinook program. For programs that occur at more than one facility (as shown on Table 1 in Section 3 of this report), the cost breakdown for the component(s) at each facility is presented in separate tables (Table 5a).

**Table 5. Annual Operating Expenses: Abernathy Salmon Culture Technology Center - Tule Fall Chinook**

| Hatchery | 1993 | 1994 | 1995 |
|---|---|---|---|
| 1. Abernathy SCTC | **$215,913** | **$219,561** | **$217,341** |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| **Total Program Costs** | **$215,913** | **$219,561** | **$217,341** |

The total expenditures for the Abernathy Salmon Culture Technology Center are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery are presented in separate tables (Table 6a).

**Table 6. Annual Operating Expenses - Abernathy Salmon Culture Technology Center**

| Program | 1993 | 1994 | 1995 |
|---|---|---|---|
| 1. Tule Fall Chinook | **$215,913** | **$219,561** | **$217,341** |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| **Total Hatchery Costs** | **$215,913** | **$219,561** | **$217,341** |

**Table 5a. Annual Operating Expenses: Abernathy Salmon Culture Technology Center - Tule Fall Chinook**

**Expenditure Occurring at Abernathy SCTC**

| Component | 1993 | 1994 | 1995 |
|---|---|---|---|
| Personnel Costs | $156,535 | $152,482 | $121,292 |
| Operational Costs | $59,378 | $64,807 | $71,576 |
| Capital Costs | | $2,272 | $24,473 |
| Indirect Costs | | | |
| Lumped Hatchery Costs | | | |
| Lumped Third-Party Costs | | | |
| **Total Hatchery Costs** | **$215,913** | **$219,561** | **$217,341** |
| **Source of Funds** | | | |
| Mitchell Act | **100%** | **100%** | **100%** |
| | | | |
| Program Production (lb) | | | |
| Total Production (lb) | | | |
| Program as Percent of Total | 100% | 100% | 100% |
| **Program Costs** | **$215,913** | **$219,561** | **$217,341** |

When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

## Table 6a. Detailed Expenditures at Abernathy Salmon Culture Technology Center by Program

### Tule Fall Chinook

| Component | 1993 | 1994 | 1995 |
|---|---|---|---|
| Personnel Costs | $156,535 | $152,482 | $121,292 |
| Operational Costs | $59,378 | $64,807 | $71,576 |
| Capital Costs | | $2,272 | $24,473 |
| Indirect Costs | | | |
| Lumped Hatchery Costs | | | |
| Lumped Third-Party Costs | | | |
| **Total Hatchery Costs** | **$215,913** | **$219,561** | **$217,341** |
| **Source of Funds** | | | |
| Mitchell Act | **100%** | **100%** | **100%** |
| | | | |
| Program Production (lb) | | | |
| Total Production (lb) | | | |
| Program as Percent of Total | 100% | 100% | 100% |
| **Program Costs** | **$215,913** | **$219,561** | **$217,341** |

When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.